Liquid-Liquid Equilibria for Room Temperature Ionic Liquids 1-Alkyl-3-Methylimidazolium Hexafluorophosphate (C4 to C8) + Ethanol + Water and Partition Coefficients of Ethanol between Water and Ionic Liquid

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The binodal curves and liquid-liquid equilibrium data have been determined for mixtures of water + 1-alkyl-3-methylimidazolium-hexafluorophosphate + ethanol at 25 ˚C and 40 ˚C. The partitioning coefficients of ethanol between water and 1-alkyl-3-methylimidazolium hexafluorophosphate were derived over a range of compositions. Measurements were made using NMR spectroscopy to determine the concentration of the components. The solubility of ionic liquid in water and water in ionic liquid was found to decrease with increasing alkyl chain length but increases with the temperature. The two-phase region on the binodal curves increased as the alkyl chain length increased but decreased at a higher temperature. The partitioning coefficients were found to increase with the overall concentration of ethanol. Ethanol partitioned more favorably into the ionic liquid as the alkyl chain length increased. These results are compared with those predicted from molecular mechanics calculations using Cosmotherm.